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Non-Contact Sensor Bleed Detection

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During the casting of molten aluminum, the molten metal can escape from the confinements of the mold, or the ingot shell, resulting in what is typically called a bleed out. This bleed out is a safety hazard, as the uncontrolled molten metal can result in an explosion. Detecting this bleed out can be difficult, as the environment where a bleed out would occur is unfavorable for detection, as steam and water create visibility issues. The author has discovered that a non-contact sensor, such as, for example, those used in car washes, can penetrate through the environment and help detect the bleed out.

The sensor may be like a photoelectric eye, with a transmitter and receiver, similar to what is used to detect a person or item in the path of a garage door or other sensor capable of "seeing" through water and steam in a casting environment. An interruption of the through beam of the sensor indicates something is in the path of the sensor. When used in casting systems, molten metal from the mold would be the item interrupting the trough beam of the sensor, and can indicate a bleed out.

To utilize such a sensor in a casting system, a transmitter and receiver could be placed along each rolling face of a vertical direct chill (DC) ingot, far enough from the mold to prevent damage to the sensor from a bleed out. A transmitter and receiver could also be placed at the extreme ends of the casting pit to capture bleed outs from the end faces of the ingot. By placing a sensor along each of the rolling faces, the sensor system would be capable of detecting individual rolling face bleed outs. Figure 1 below shows an example arrangement in a DC casting system.

The disclosed sensor system allows for a quicker response to bleed outs in an effort to minimize explosions, as well as the amount of metal spilled into pits. The disclosed sensor system could be used with other methods of casting for bleed out detection.

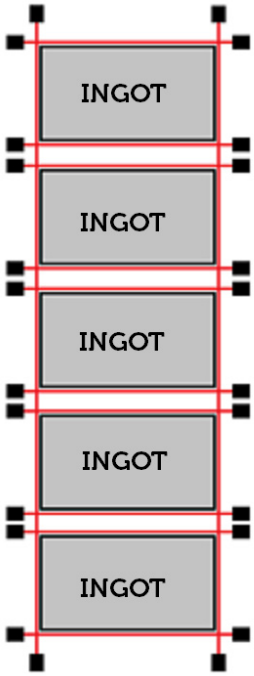

Figure 1